Appendix 1

Emission Calculations and Vendor Supplied Equipment Information

Particulate Matter Emissions Analysis

Powder Handling Operations
Idaho Milk Products

	Output (lb/hr)
Skim Dryer	
P101A Dryer Baghouse 1 (to ambient)	3.80
P101B Dryer Baghouse 2 (to ambient)	3.80
Skim Fluid-Bed	
P102 Fluid Bed Baghouse (to ambient)	0.78
Permeate Dryer	
P103 Permeate Dryer Scrubber (to ambient)	6.92
Permeate Fluid-Bed	
P104 Permeate Fluid-Bed Baghouse (to ambient)	1.97
Permeate Powder Receiver	
P105 Permeate Powder Receiver Baghouse (to ambient)	0.047
Total (to ambient):	17.31

Process Weight Rule (IDAPA 58.01.01.700)

$E=1.10 \times PW^{0.25}$

	Maximum
PW (raw milk/day) =	3,000,000
PW (raw milk/hr) =	125,000
E (lb PM/hr) =	**20.68**

Criteria Air Pollutant Emissions
Skim Milk Dryer (P101)

Combustion Source Characteristics

Dryer Manufacturer	Maxon
Burner Model	Crossfire Line Burner
Input Heat Capacity (BTU/hr)	40,000,000
Fuel	Natural Gas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	39,216
Annual Fuel Consumption (scf/yr)	343,529,412

Site Information

Jerome Barometric Pressure (mm Hg)	664.34

Stack Data [c]

Stack ID	P101A	P101B
Stack Height (ft)	135.75	135.75
Stack Diameter (ft)	5.75	5.75
Exit Gas Temperature (°F)	190	190
Wet Actual Flow Rate (acfm)	63,500	63,500
Stack Velocity (m/s)	12.42	12.42
Fd (dscf stack gas/BTU)	0.00871	
Grain Loading Flow Rate (dscfm)	7,756	
Baghouse Efficiency	99.00%	

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	NG Combustion + Process	See PM Calculation Sheet		7.896	34.6	0.99
SO_2	NG Combustion	0.6	lb/10^6 scf	0.024	0.1	0.0030
NO_x	NG Combustion	0.0459	lb/10^6 BTU	1.835	8.0	0.231
CO	NG Combustion	0.37	lb/10^6 BTU	14.892	65.2	1.876
VOC	NG Combustion	5.5	lb/10^6 scf	0.216	0.9	0.027
Lead	NG Combustion	0.0005	lb/10^6 scf	1.96E-05	0.0	2.47E-06

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	NG Combustion + Process	See PM_{10}		7.896	34.6	0.99
Beryllium	NG Combustion	<1.2E-5	lb/10^6 scf	4.71E-07	0.0	5.93E-08
Mercury	NG Combustion	2.60E-04	lb/10^6 scf	1.02E-05	0.0	1.28E-06

PM Grain Loading Standard[b]

Pollutant	Pollutant Source	Potential Emissions (lb/hr)	Grain Load @ 3% Oxygen (gr/dscf)	PM Grain Standard[b] (gr/dscf)	Meets Standard?
PM	NG Combustion	0.298	0.004	0.015	yes

Notes:
(a) Emission factor for PM/PM10 estimated from vendor supplied information (see attached PM calculation sheet) and from natural gas fuel combustion emission factors AP-42 Chapter 1.4, "Natural Gas Combustion". NOx and CO emissions were estimated based on information provided by the vendor. The remaining pollutant emisssions were estimated using AP-42 emission factors for natural gas combustion (Chapter 1.4).
(b) IDAPA 58.01.01.677, computed for fuel combusting equipment only, excludes particulate emissions associated with the milk drying process.
(c) Prior to discharge to the atmosphere at each stack emissions are routed through two cyclones and a baghouse before final discharge. Listed emissions rates are combined emissions that are emitted through both stacks. For modeling purposes emissions were modeled with one stack not emitting (i.e. P101A emitting full emission rate while P101B not emitting and vice versa) for PM10 but all other pollutants were modeled at the full rate through each stack.

Toxic Air Pollutant Emissions
Skim Milk Dryer (P101)

Combustion Source Characteristics

Boiler Manufacturer	Maxon
Burner Model	Crossfire Line Burner
Input Heat Capacity (BTU/hr)	40,000,000
Fuel	Natural Gas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	39,216
Annual Fuel Consumption (scf/yr)	343,529,412

Toxic Air Pollutants

Pollutant	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (g/s)	Emission Limit[b] (lb/hr)
Arsenic	2.00E-04	lb/10^6 scf	7.84E-06	9.88E-07	1.50E-06
Barium	4.40E-03	lb/10^6 scf	1.73E-04	2.17E-05	3.30E-02
Benzene	2.10E-03	lb/10^6 scf	8.24E-05	1.04E-05	8.00E-04
Beryllium	<1.2E-5	lb/10^6 scf	4.71E-07	5.93E-08	2.80E-05
Benzo(a)pyrene	<1.2E-6	lb/10^6 scf	4.71E-08	5.93E-09	2.00E-06
Bis (2-ethylhexyl)phthalate	FNA	lb/10^6 scf	FNA	FNA	2.80E-02
Cadmium	1.10E-03	lb/10^6 scf	4.31E-05	5.44E-06	3.70E-06
Chromium	1.40E-03	lb/10^6 scf	5.49E-05	6.92E-06	3.30E-02
Cobalt	8.40E-05	lb/10^6 scf	3.29E-06	4.15E-07	3.30E-03
Copper	8.50E-04	lb/10^6 scf	3.33E-05	4.20E-06	3.33E-01
Dibutylphthalate	FNA	lb/10^6 scf	FNA	FNA	6.70E-02
Dichlorobenzene	1.20E-03	lb/10^6 scf	4.71E-05	5.93E-06	2.00E+01
Ethylbenzene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Fluorene	2.80E-06	lb/10^6 scf	1.10E-07	1.38E-08	1.33E-01
Formaldehyde	7.50E-02	lb/10^6 scf	2.94E-03	3.71E-04	5.10E-04
Hexane	1.80E+00	lb/10^6 scf	7.06E-02	8.89E-03	1.20E+01
Manganese	3.80E-04	lb/10^6 scf	1.49E-05	1.88E-06	3.33E-01
Mercury	2.60E-04	lb/10^6 scf	1.02E-05	1.28E-06	3.00E-03
Molybdenum	1.10E-03	lb/10^6 scf	4.31E-05	5.44E-06	3.33E-01
Napthalene	6.10E-04	lb/10^6 scf	2.39E-05	3.01E-06	3.33E+00
Nickel	2.10E-03	lb/10^6 scf	8.24E-05	1.04E-05	2.70E-05
Pentane	2.60E+00	lb/10^6 scf	1.02E-01	1.28E-02	1.18E+02
Phenol	FNA	lb/10^6 scf	FNA	FNA	1.27E+00
Selenium	<2.4E-5	lb/10^6 scf	9.41E-07	1.19E-07	1.30E-02
Toluene	3.40E-03	lb/10^6 scf	1.33E-04	1.68E-05	2.50E+01
Vanadium	2.30E-03	lb/10^6 scf	9.02E-05	1.14E-05	3.00E-03
o-Xylene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Zinc	2.90E-02	lb/10^6 scf	1.14E-03	1.43E-04	6.67E-01

Notes:
(a) Emission Factors from AP-42 Chapter 1.4, "Natural Gas Combustion".
(b) IDAPA 58.01.01.585 and 586
* FNA - Factor Not Available

Capacities and Operating Data

Performance Data

Lineal heat release at high fire	Btu/hr/ft	1,000,000	1,250,000	1,500,000	1,750,000	2,000,000	2,250,000	2,500,000
Minimum lineal heat release	Btu/hr/ft	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Turndown ratio		10:1	12.5:1	15:1	17.5:1	20:1	22.5:1	25:1
Flame length	feet [1]	2.7	3.2	3.6	4.0	4.3	4.7	5.0
Pilot pressure/heat release	"w.c.* [2] / Btu/hr	5-8" w.c. / 40,000 Btu/hr						
Combustion air flow	SCFM	250	313	375	438	500	563	625
Air pressure at burner inlet	("w.c.) [3]	2.3	3.6	5.1	7.0	9.1	11.5	14.2
Air pressure at burner test connection	("w.c.)*	2.1	3.3	4.7	6.4	8.3	10.5	13.0
Fuel pressure at burner inlet (natural gas)	("w.c.) [3]	8.5	13.3	19.2	26.1	34.1	43.2	53.3
Fuel pressure at burner test connection (natural gas)	("w.c.)*	7.4	11.5	16.6	22.5	29.4	37.3	46.0
NOx emissions [4]	ppm @ 3% O_2	<25 ppm corrected to 3% O_2 dry						
CO emissions [4]	ppm @ 3% O_2	<250 ppm corrected to 3% O_2 dry						

[1] Flame length is based on 50% excess combustion air. Flame length will vary depending on various application parameters (e.g. passing air stream velocity, oxygen content, and combustion air preheat temperature)
[2] At inlet of adjustable pilot orifice.
[3] Air and gas DP is differential over system static pressure.
[4] Emissions stated are not guaranteed. Actual emission performance may vary. Contact Maxon for specific application details.
*Differential pressures measured at burner test connections. Air and gas DP is differential over system static pressure.

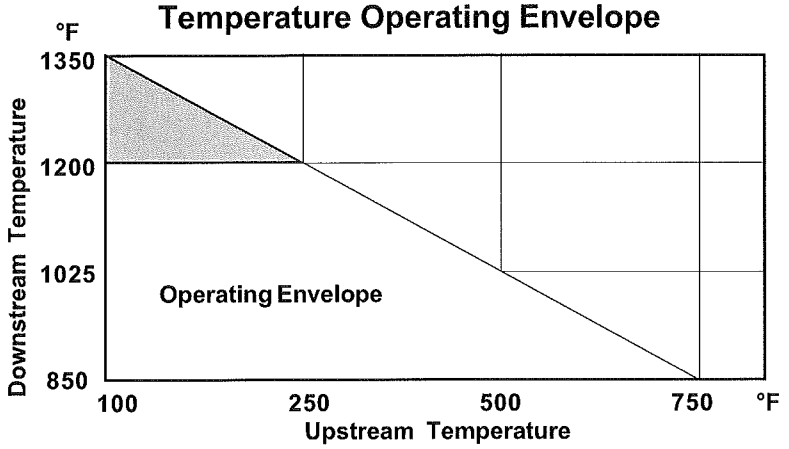
Operating Environment

Variable		Minimum	Maximum
Inlet Combustion Air Temp.	°F	Ambient	400
Inlet Combustion Air O_2 Level	% O_2	20.8	20.8
Air Stream Cross Velocity	ft/min	0	3000
Air Stream Axial Velocity	ft/min	0	4000
Upstream Air Temperature	°F	See Chart Below	
Downstream Air Temperature	°F		
Process Air Stream O_2 Level	% O_2	4	21

The burner can operate in a variety of environments. Typical operating environments, limits on their variables, and notes concerning operation of the burner are presented at left.

It is important to note that inlet combustion variables such as O_2 level and combustion air temperature will change air pressure requirements and/or maximum firing capacity.

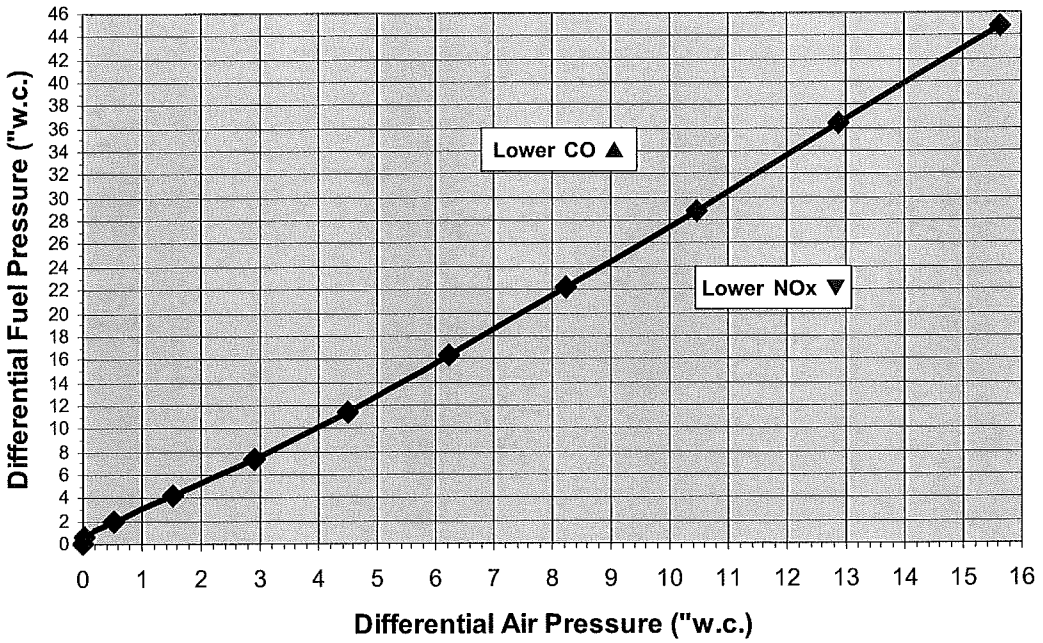
Temperature Operating Envelope



Consult Maxon for operation in shaded region. Ability to operate in shaded region is dependent upon operating conditions.

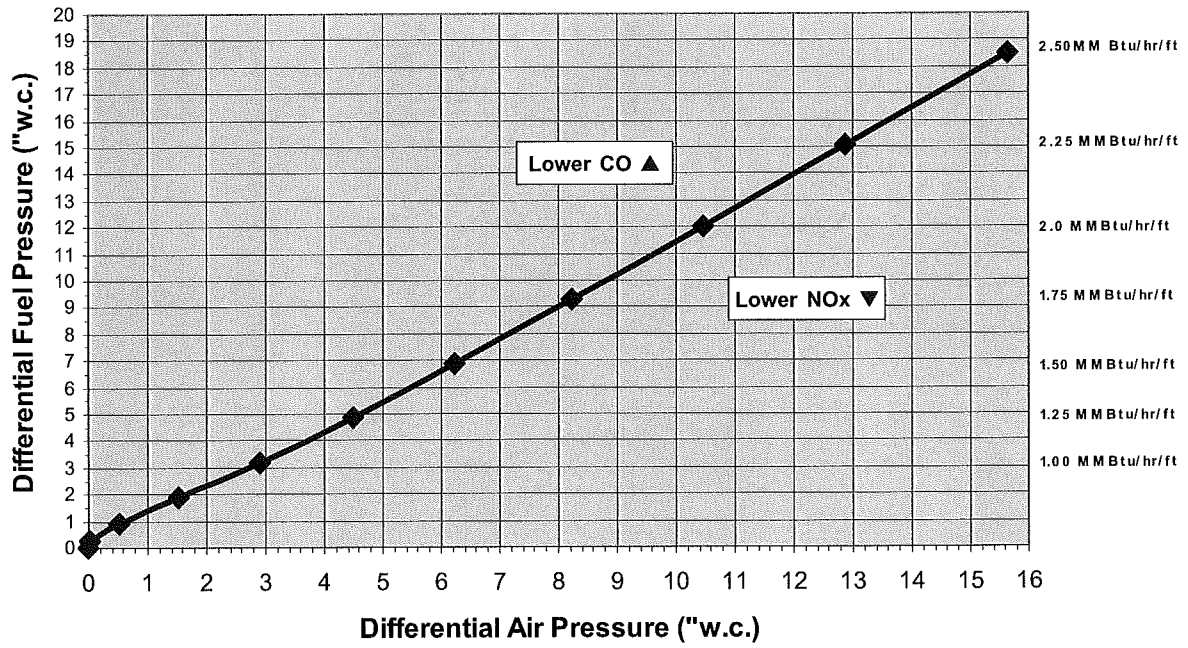
Capacities and Operating Data

Natural Gas Fuel/Air Settings



NOTE: Pressure measured at burner test connections; refer to inlet pressure requirements for fan sizing

Propane Fuel/Air Settings



NOTE: Pressure measured at burner test connections; refer to inlet pressure requirements for fan sizing

Criteria Air Pollutant Emissions
Skim Milk Fluid-Bed (P102)

Combustion Source Characteristics	
Manufacturer	C/E/Rogers
Model	Fluid-Bed Baghouse
Baghouse Efficiency	99.00%

Stack Data	
Stack ID	P102
Stack Height (ft)	135.75
Stack Diameter (ft)	2.50
Exit Gas Temperature (°F)	130
Wet Actual Flow Rate (acfm)	9,090.7
Stack Velocity (m/s)	9.40

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	Process	See PM Calculation Sheet		0.775	3.4	0.10

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	Process	See PM_{10}		0.775	3.4	0.10

Notes:
(a) Emission factor for PM/PM10 estimated from vendor supplied information (see attached PM calculation sheet).

Criteria Air Pollutant Emissions
Permeate Dryer (P103)

Combustion Source Characteristics	
Dryer Manufacturer	Maxon
Burner Model	Crossfire Line Burner
Input Heat Capacity (BTU/hr)	12,000,000
Fuel	Natural Gas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	11,765
Annual Fuel Consumption (scf/yr)	103,058,824

Site Information	
Jerome Barometric Pressure (mm Hg)	664.34

Stack Data	
Stack ID	P103
Stack Height (ft)	116.75
Stack Diameter (ft)	6.50
Exit Gas Temperature (°F)	112
Wet Actual Flow Rate (acfm)	52,463
Stack Velocity (m/s)	8.03
Fd (dscf stack gas/BTU)	0.00871
Grain Loading Flow Rate (dscfm)	2,327
Scrubber Efficiency	73.00%

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	NG Combustion + Process	See PM Calculation Sheet		7.006	30.7	0.88
SO_2	NG Combustion	0.6	lb/10^6 scf	0.007	0.0	0.0009
NO_x	NG Combustion	0.0459	lb/10^6 BTU	0.550	2.4	0.069
CO	NG Combustion	0.37	lb/10^6 BTU	4.467	19.6	0.563
VOC	NG Combustion	5.5	lb/10^6 scf	0.065	0.3	0.008
Lead	NG Combustion	0.0005	lb/10^6 scf	5.88E-06	0.0	7.41E-07

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	NG Combustion + Process	See PM_{10}		7.006	30.7	0.88
Beryllium	NG Combustion	<1.2E-5	lb/10^6 scf	1.41E-07	0.0	1.78E-08
Mercury	NG Combustion	2.60E-04	lb/10^6 scf	3.06E-06	0.0	3.85E-07

PM Grain Loading Standard[b]

Pollutant	Pollutant Source	Potential Emissions (lb/hr)	Grain Load @ 3% Oxygen (gr/dscf)	PM Grain Standard[b] (gr/dscf)	Meets Standard?
PM	NG Combustion	0.089	0.004	0.015	yes

Notes:
(a) Emission factor for PM/PM10 estimated from vendor supplied information (see attached PM calculation sheet) and from natural gas fuel combustion emission factors AP-42 Chapter 1.4, "Natural Gas Combustion". NOx and CO emissions were estimated based on information provided by the vendor. The remaining pollutant emisssions were estimated using AP-42 emission factors for natural gas combustion (Chapter 1.4).
(b) IDAPA 58.01.01.677, computed for fuel combusting equipment only, excludes particulate emissions associated with the milk drying process.

Toxic Air Pollutant Emissions
Permeate Dryer (P103)

Combustion Source Characteristics

Boiler Manufacturer	Maxon
Burner Model	Crossfire Line Burner
Input Heat Capacity (BTU/hr)	12,000,000
Fuel	Natural Gas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	11,765
Annual Fuel Consumption (scf/yr)	103,058,824

Toxic Air Pollutants

Pollutant	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (g/s)	Emission Limit[b] (lb/hr)
Arsenic	2.00E-04	lb/10^6 scf	2.35E-06	2.96E-07	1.50E-06
Barium	4.40E-03	lb/10^6 scf	5.18E-05	6.52E-06	3.30E-02
Benzene	2.10E-03	lb/10^6 scf	2.47E-05	3.11E-06	8.00E-04
Beryllium	<1.2E-5	lb/10^6 scf	1.41E-07	1.78E-08	2.80E-05
Benzo(a)pyrene	<1.2E-6	lb/10^6 scf	1.41E-08	1.78E-09	2.00E-06
Bis (2-ethylhexyl)phthalate	FNA	lb/10^6 scf	FNA	FNA	2.80E-02
Cadmium	1.10E-03	lb/10^6 scf	1.29E-05	1.63E-06	3.70E-06
Chromium	1.40E-03	lb/10^6 scf	1.65E-05	2.08E-06	3.30E-02
Cobalt	8.40E-05	lb/10^6 scf	9.88E-07	1.25E-07	3.30E-03
Copper	8.50E-04	lb/10^6 scf	1.00E-05	1.26E-06	3.33E-01
Dibutylphthalate	FNA	lb/10^6 scf	FNA	FNA	6.70E-02
Dichlorobenzene	1.20E-03	lb/10^6 scf	1.41E-05	1.78E-06	2.00E+01
Ethylbenzene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Fluorene	2.80E-06	lb/10^6 scf	3.29E-08	4.15E-09	1.33E-01
Formaldehyde	7.50E-02	lb/10^6 scf	8.82E-04	1.11E-04	5.10E-04
Hexane	1.80E+00	lb/10^6 scf	2.12E-02	2.67E-03	1.20E+01
Manganese	3.80E-04	lb/10^6 scf	4.47E-06	5.63E-07	3.33E-01
Mercury	2.60E-04	lb/10^6 scf	3.06E-06	3.85E-07	3.00E-03
Molybdenum	1.10E-03	lb/10^6 scf	1.29E-05	1.63E-06	3.33E-01
Napthalene	6.10E-04	lb/10^6 scf	7.18E-06	9.04E-07	3.33E+00
Nickel	2.10E-03	lb/10^6 scf	2.47E-05	3.11E-06	2.70E-05
Pentane	2.60E+00	lb/10^6 scf	3.06E-02	3.85E-03	1.18E+02
Phenol	FNA	lb/10^6 scf	FNA	FNA	1.27E+00
Selenium	<2.4E-5	lb/10^6 scf	2.82E-07	3.56E-08	1.30E-02
Toluene	3.40E-03	lb/10^6 scf	4.00E-05	5.04E-06	2.50E+01
Vanadium	2.30E-03	lb/10^6 scf	2.71E-05	3.41E-06	3.00E-03
o-Xylene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Zinc	2.90E-02	lb/10^6 scf	3.41E-04	4.30E-05	6.67E-01

Notes:
(a) Emission Factors from AP-42 Chapter 1.4, "Natural Gas Combustion".
(b) IDAPA 58.01.01.585 and 586
* FNA - Factor Not Available

Criteria Air Pollutant Emissions
Permeate Fluid-Bed (P104)

Combustion Source Characteristics	
Manufacturer	C/E/Rogers
Model	Fluid-Bed Baghouse
Baghouse Efficiency	99.80%

Stack Data	
Stack ID	P104
Stack Height (ft)	116.75
Stack Diameter (ft)	4.167
Exit Gas Temperature (°F)	130
Wet Actual Flow Rate (acfm)	29,384
Stack Velocity (m/s)	10.94

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	Process	See PM Calculation Sheet		1.97	8.6	0.25

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	Process	See PM_{10}		1.97	8.6	0.25

Notes:
(a) Emission factor for PM/PM10 estimated from vendor supplied information (see attached PM calculation sheet).

Criteria Air Pollutant Emissions
Permeate Powder Receiving (P105)

Combustion Source Characteristics

Manufacturer	C/E/Rogers
Model	Permeate Powder Receiving Baghouse
Baghouse Efficiency	99.999%

Stack Data

Stack ID	P105
Stack Height (ft)	43.083
Stack Diameter (ft)	Horizontal[b]
Exit Gas Temperature (°F)	Ambient[b]
Wet Actual Flow Rate (acfm)	NA
Stack Velocity (m/s)	Horizontal[b]
Discharge Orientation	Horizontal

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	Process	See PM Calculation Sheet		0.047	0.2	0.01

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	Process	See PM_{10}		0.047	0.2	0.01

Notes:
(a) Emission factor for PM/PM10 estimated from vendor supplied information (see attached PM calculation sheet).
(b) Modeling velocity = 0.001 m/s and diameter = 0.001 m and ambient temperature discharge default value of 0 K.

Criteria Air Pollutant Emissions
Boiler #1 (P106)

Combustion Source Characteristics

Boiler Manufacturer	Superior Boiler Works (or equivalent)
Burner Model	Super Seminole 4000 (or Equivalent)
Input Heat Capacity (BTU/hr)	33,475,000
Fuel	Natural Gas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	32,819
Annual Fuel Consumption (scf/yr)	287,491,176

Site Information

Jerome Barometric Pressure (mm Hg)	664.34

Stack Data

Stack Height (ft)	39.5
Stack Diameter (ft)	4.083
Exit Gas Temperature (°F)	350
Wet Actual Flow Rate (acfm)	10,389
Wet Standard Flow Rate (wscfm)	5,919
Dry Standard Flow Rate (dscfm)	4,859
Grain Loading Flow Rate (dscfm)	6,491
Stack Velocity (m/s)	4.03
Fd (dscf stack gas/BTU)	0.00871
Fw (wscf stack gas/BTU)	0.01061

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	NG Combustion	7.6	lb/10^6 scf	0.249	1.1	0.031
SO_2	NG Combustion	0.6	lb/10^6 scf	0.020	0.1	0.002
NO_x	NG Combustion	100	lb/10^6 scf	3.282	14.4	0.414
CO	NG Combustion	84	lb/10^6 scf	2.757	12.1	0.347
VOC	NG Combustion	5.5	lb/10^6 scf	0.181	0.8	0.023
Lead	NG Combustion	0.0005	lb/10^6 scf	1.64E-05	0.0	2.07E-06

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	NG Combustion	See PM_{10}	See PM_{10}	0.249	1.092	3.14E-02
Beryllium	NG Combustion	<1.2E-5	lb/10^6 scf	3.94E-07	0.000	4.96E-08
Mercury	NG Combustion	2.60E-04	lb/10^6 scf	8.53E-06	0.000	1.08E-06

PM Grain Loading Standard[b]

Pollutant	Pollutant Source	Potential Emissions (lb/hr)	Grain Load @ 3% Oxygen (gr/dscf)	PM Grain Standard[b] (gr/dscf)	Meets Standard?
PM	NG Combustion	0.249	0.004	0.015	yes

Notes:
(a) Emission factors from AP-42 Chapter 1.4, "Natural Gas Combustion", unless otherwise noted.
(b) IDAPA 58.01.01.677
(c) Boiler #1 and #2 are fully redundant. Only one boiler will operate at any one time. Maximum natural gas combustion in boilers will be 287,491,176 scf/year.

Toxic Air Pollutant Emissions
Boiler #1 (P106)

Combustion Source Characteristics

Boiler Manufacturer	Superior Boiler Works (or equivalent)
Burner Model	Super Seminole 4000 (or Equivalent)
Input Heat Capacity (BTU/hr)	33,475,000
Fuel	Natural Gas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	32,819
Annual Fuel Consumption (scf/yr)	287,491,176

Site Information

Jerome Barometric Pressure (mm Hg)	664.34

Stack Data

Stack Height (ft)	39.5
Stack Diameter (ft)	4.08
Exit Gas Temperature (°F)	350
Wet Actual Flow Rate (acfm)	10,389
Wet Standard Flow Rate (wscfm)	5,919
Dry Standard Flow Rate (dscfm)	4,859
Grain Loading Flow Rate (dscfm)	6,491
Stack Velocity (m/s)	4.03
Fd (dscf stack gas/BTU)	0.00871
Fw (wscf stack gas/BTU)	0.01061

Toxic Air Pollutants

Pollutant	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (g/s)	Emission Limit[b] (lb/hr)
Arsenic	2.00E-04	lb/10^6 scf	6.56E-06	8.27E-07	1.50E-06
Barium	4.40E-03	lb/10^6 scf	1.44E-04	1.82E-05	3.30E-02
Benzene	2.10E-03	lb/10^6 scf	6.89E-05	8.68E-06	8.00E-04
Beryllium	<1.2E-5	lb/10^6 scf	3.94E-07	4.96E-08	2.80E-05
Benzo(a)pyrene	<1.2E-6	lb/10^6 scf	3.94E-08	4.96E-09	2.00E-06
Bis (2-ethylhexyl)phthalate	FNA	lb/10^6 scf	FNA	FNA	2.80E-02
Cadmium	1.10E-03	lb/10^6 scf	3.61E-05	4.55E-06	3.70E-06
Chromium	1.40E-03	lb/10^6 scf	4.59E-05	5.79E-06	3.30E-02
Cobalt	8.40E-05	lb/10^6 scf	2.76E-06	3.47E-07	3.30E-03
Copper	8.50E-04	lb/10^6 scf	2.79E-05	3.51E-06	3.33E-01
Dibutylphthalate	FNA	lb/10^6 scf	FNA	FNA	6.70E-02
Dichlorobenzene	1.20E-03	lb/10^6 scf	3.94E-05	4.96E-06	2.00E+01
Ethylbenzene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Fluorene	2.80E-06	lb/10^6 scf	9.19E-08	1.16E-08	1.33E-01
Formaldehyde	7.50E-02	lb/10^6 scf	2.46E-03	3.10E-04	5.10E-04
Hexane	1.80E+00	lb/10^6 scf	5.91E-02	7.44E-03	1.20E+01
Manganese	3.80E-04	lb/10^6 scf	1.25E-05	1.57E-06	3.33E-01
Mercury	2.60E-04	lb/10^6 scf	8.53E-06	1.08E-06	3.00E-03
Molybdenum	1.10E-03	lb/10^6 scf	3.61E-05	4.55E-06	3.33E-01
Napthalene	6.10E-04	lb/10^6 scf	2.00E-05	2.52E-06	3.33E+00
Nickel	2.10E-03	lb/10^6 scf	6.89E-05	8.68E-06	2.70E-05
Pentane	2.60E+00	lb/10^6 scf	8.53E-02	1.08E-02	1.18E+02
Phenol	FNA	lb/10^6 scf	FNA	FNA	1.27E+00
Selenium	<2.4E-5	lb/10^6 scf	7.88E-07	9.92E-08	1.30E-02
Toluene	3.40E-03	lb/10^6 scf	1.12E-04	1.41E-05	2.50E+01
Vanadium	2.30E-03	lb/10^6 scf	7.55E-05	9.51E-06	3.00E-03
o-Xylene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Zinc	2.90E-02	lb/10^6 scf	9.52E-04	1.20E-04	6.67E-01

Notes:
(a) Emission Factors from AP-42 Chapter 1.4, "Natural Gas Combustion".
(b) IDAPA 58.01.01.585 and 586
* FNA - Factor Not Available

SUPERIOR BOILER WORKS, Inc

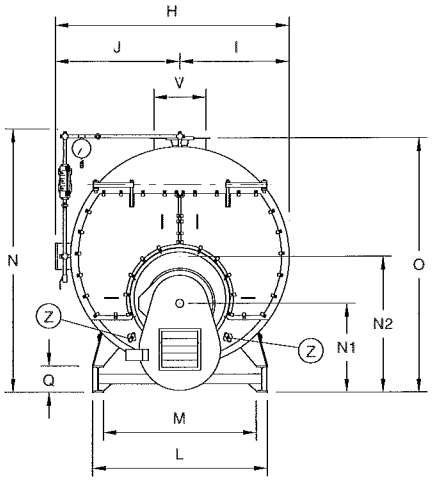
SUPER SEMINOLE

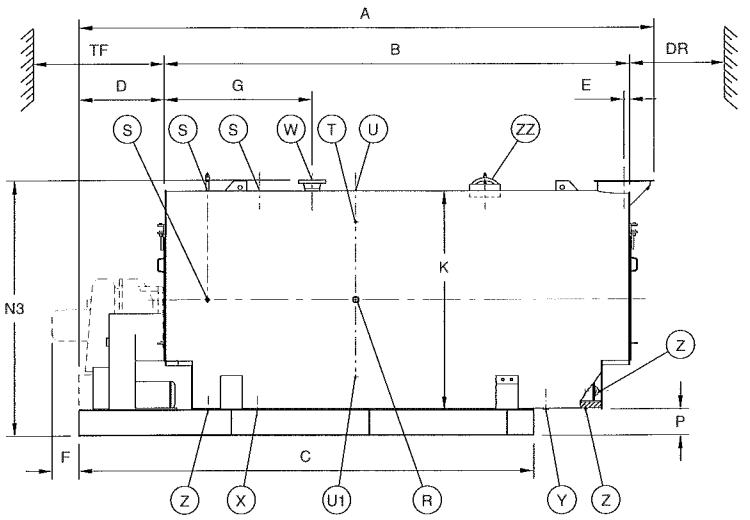
DIMENSIONAL DATA
STEAM BOILERS
15 AND 150 PSIG

3 PASS WET BACK

70 THRU 1000 BoHP

5 SQ. FT. / BoHP





(Left Side)

FORM CATX6SSF
ISSUED: 3-31-03

NOMINAL BOILER HORSEPOWER		70	80	100	125	150	200	250	300	350	400	500	600	700	750	800	900	1000
UNIT MODEL NUMBER		350	400	500	625	750	1000	1250	1500	1750	2000	2500	3000	3500	3750	4000	4500	5000
LENGTHS: Overall	A	158	171	197	183	205	210	241	270	278	263	305	301	297	305	319	324	343
Shell	B	124	137	163	148	170	160	191	220	226	211	253	248 1/2	244	252	266	262	281
Base	C	115	128	154	136 1/2	158 1/2	160	191	220	224	208	250	247 1/2	236	244	258	263	282
Front Plate To Front Skid Extension	D	26	26	26	26	26	40	40	40	40	40	40	40	40	40	40	49	49
Rear Plate To Center Line Of Stack	E	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Front Of Base To End Of Burner	F																	
(GP)		-	-	-	9	9	5	5	-	-	-	-	-	-	-	-	13	12
(IC)		12	15	15	15	15	11	11	12	12	15	20	23	23				
Front Plate To Nozzle	G	43	43	47	47	47	52	52	52	63	63	67	74	64	64	64	64	64
WIDTHS: Overall	H	73	73	73	80	80	90	90	90	96	107	107	113	124	124	124	130	130
Centerline To Lagging	I	33	33	33	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2	44 1/2	50	50	53	57	57	57	61	61
Water Column/Panel	J	40	40	40	43 1/2	43 1/2	48 1/2	48 1/2	48 1/2	51 1/2	57	57	60	67	67	67	69	69
Over Jacket	K	66	66	66	73	73	83	83	83	89	100	100	106	114	114	114	122	122
Base Width Outside	L	50	50	50	50 1/2	50 1/2	65 1/2	65 1/2	65 1/2	70 1/2	80	80	87	87	87	87	87	87
Base Width Inside	M	42	42	42	42 1/2	42 1/2	57 1/2	57 1/2	57 1/2	62 1/2	70	70	77	77	77	77	77	77
HEIGHTS: Overall	N	85	85	85	92	92	102	102	102	108	119	119	125	133	133	133	141	141
Centerline of Burner	N1	34	34	34	35 1/2	35 1/2	39	39	39	40	43	43	45	46	46	46	50	50
Centerline of Boiler	N2	45	45	45	48 1/2	48 1/2	53 1/2	53 1/2	53 1/2	56 1/2	62	62	65	69	69	69	75	75
Top of Steam Nozzle	N3	78 1/2	78 1/2	80 1/2	89 3/8	89 3/8	99 1/2	99 1/2	99 1/2	105 1/2	116 1/2	116 1/2	122 1/2	130 5/8	130 5/8	130 5/8	140 5/8	140 5/8
Base to Stack Outlet	O	81 1/2	81 1/2	81 1/2	89	89	99	99	99	105	116	116	122	130	130	130	140	140
Base To Lagging	P	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	14	14
Height Of Runner	Q	6	6	6	6	6	8	8	8	8	12	12	12	12	12	12	12	12
CONNECTIONS:																		
Feedwater-Right/Left	R	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	2	2	2	2	2	2	2	2	2	2	2	2
Auxiliary Conn-Right/Top	S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Surface Blowoff-Right	T	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Auxiliary Conn-Top	U	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Low Fire Hold(Left Side)	U1	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Flanged Stack Conn I.D.	V	15 7/8	15 7/8	15 7/8	17 7/8	17 7/8	19 7/8	19 7/8	19 7/8	23 7/8	23 7/8	23 7/8	25 7/8	25 7/8	25 7/8	25 7/8	25 7/8	25 7/8
HIGH PRESSURE																		
Steam Nozzle	W	3	3	4†	4†	4†	6†	6†	6†	6†	6†	8†	8†	8†	8†	8†	8†	8†
Blowdown Front	X	-	-	-	-	-	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2
Rear	Y	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2
LOW PRESSURE																		
Steam Nozzle	W	6*	6*	6*	6*	6*	8*	8*	10*	10*	12*	12*	12*	12*	12*	12*	12*	12*
Blowdown Front	X	-	-	-	-	-	2	2	2	2	2	2	2	2	2	2	2	2
Rear	Y	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	2	2	2	2	2	2	2
ACCESS OPENINGS:																		
Handholes 3" x 4"	Z	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Manway 12" x 16"	ZZ	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MINIMUM CLEARANCES**																		
Tube Removal Front	TF	90 1/2	103 1/2	129 1/2	114 1/2	136 1/2	123 1/2	154 1/2	183 1/2	183 1/2	168 1/2	210 1/2	203	198 1/2	206 1/2	220 1/2	216 1/2	235 1/2
Rear Door Swing Rear	DR	14	14	14	18	18	16	16	16	20	22	22	24	28	28	28	39	39

NOTE: * 150 PSIG RF FLANGE
† 300 PSIG RF FLANGE

NOTE: All Dimensions Are Approximate And May Be Used For Layout Only.
SUPERIOR BOILER WORKS, Inc Reserves The Right To Change Dimensions Due To Product Revisions Or Job Requirements.
** Check Local, State And Federal Code.

SEMINOLE 3 PASS STEAM BOILER

SUPERIOR BOILER WORKS, Inc
3524 EAST FOURTH ST. HUTCHINSON, KANSAS 67501 (316) 662-6693

FORM CAT6SB
Reviewed 12-2002

RATINGS: STEAM 15/150 PSIG — Sea Level To 2000' — 5 sq.ft./BoHP

NOMINAL BOILER HORSEPOWER	70	80	100	125	150	200	250	300	350	400	500	600	700	750	800	900	1000
UNIT MODEL NUMBER	350	400	500	625	750	1000	1250	1500	1750	2000	2500	3000	3500	3750	4000	4500	5000
OUTPUT MBH	2343	2678	3348	4184	5021	6695	8369	10043	11716	13390	16738	20085	23432	25106	26780	30128	33475
STEAM LBS/HR (#2)	2415	2760	3450	4312	5175	6900	8625	10350	12075	13800	17250	20700	24150	25875	27600	31050	34500
INPUT GAS (1,000 BTU) CU. FT.	2928	3347	4185	5230	6276	8368	10461	12553	14645	16737	20922	25106	29290	31382	33475	37660	41843
OIL (140,000 BTU) GAL.	20.91	23.91	29.88	37.35	44.83	59.77	74.72	89.66	104.60	119.55	149.44	179.33	209.21	224.16	239.10	269.00	298.88
OIL (150,000 BTU) GAL.	19.52	22.31	27.89	34.86	41.53	55.78	69.73	83.68	97.62	111.57	139.47	167.37	195.26	209.21	223.16	251.06	278.95

DATA:

HEATING SURFACE SQ. FT.	354	410	503	626	752	1022	1270	1536	1775	2005	2505	3039	3502	3767	4014	4520	5015
FURNACE VOLUME CU.FT. (#3)	17.25	20.99	27.21	37.16	46.45	52.44	68.57	83.44	98.90	107.57	139.77	170.71	153.99	167.19	179.51	202.11	227.24
STEAM STORAGE VOL. CU.FT.	14.03	16.25	19.94	21.98	26.28	31.36	38.54	49.04	56.35	72.91	90.11	111.47	126.45	135.30	143.55	154.08	169.99
DISENGAGING AREA SQ. FT.	29.93	34.65	42.52	41.77	49.93	53.81	66.31	76.57	87.99	87.79	108.50	119.45	120.41	128.83	136.69	139.18	153.54
WATER CAPACITY NWL GAL.	784	921	1150	1140	1381	1619	2035	2575	2991	2918	3674	4014	4267	4590	4892	5357	5948
WATER WEIGHT NWL LBS.	6522	7662	9563	9481	11485	13469	16926	21417	24878	24271	30559	33385	35489	38180	40691	44556	49472
WATER CAPACITY FULL GAL.	889	1043	1299	1304	1577	1854	2323	2942	3413	3463	4348	4848	5213	5602	5966	6509	7220
WATER WEIGHT FULL LBS.	7395	8673	10804	10849	13121	15420	19324	24469	28384	28807	36166	40320	43357	46598	49623	54143	60049
SHIPPING WEIGHT 15 PSIG (#4)	8300	9100	10400	12100	13600	17600	20200	25500	28200	30700	36500	41700	45500	48400	50600	55500	59900
SHIPPING WEIGHT 150 PSIG (#4)	9200	10100	11500	13000	14600	20500	23500	28200	31000	35600	40300	46400	51800	54800	57300	62100	66900

STANDARD FEATURES:

1. Units Designed And Fabricated To ASME Boiler And Pressure Vessel Code Requirements. Section IV–15 psig. Section I–150 psig Thru 250 psig.
2. Insulated With 2"–8 Lb. Density Mineral Fiber Insulation.
3. Jacket Material 22 Gauge Galvanized–Phosphate Coated Steel.
4. Davited Doors: Front / Rear–All Units.
5. Rear Access Plug: 17" Dia.–All Units.
6. Handholes: 3" x 4" (5) All Units.
7. Manway: 12" x 16" (1) All Units.
8. Surface Blowdown Connections.

STANDARD TRIM (BOILER)

1. ASME Safety Valve(s).
2. Water Column w/Water Level Gauge Glass, Try Cocks (As Req'd), Low Water Cutoff/Pump Control, Blowdown Valve.
3. Operating Pressure Control
4. High Limit Pressure Control (Manual Reset).
5. Firing Rate Control (Hi–Lo–Off Or Modulating Firing Only).
6. Pressure Gauge w/Shutoff And Inspectors Gauge Cocks.
7. Control Circuit Terminal Strips.
8. Auxiliary Low Water Cutoff, Probe in Shell.

Notes:

1. All Units Manufactured To UL Listing Procedures.
2. Steam Output–Based On Steam From And At 212°F.
3. Furnace Volume Is Furnace Only (Wet Backed Turnaround Not Included).
4. Shipping Weights Are Based On Units With Natural Gas Burners–Weights Of Units For Air Atomized Oil Or Combination Gas/Oil Firing Will Be Higher.

Criteria Air Pollutant Emissions
Boiler #2 (P107)

Combustion Source Characteristics

Boiler Manufacturer	Superior Boiler Works (or equivalent)
Burner Model	Super Seminole 4000 (or Equivalent)
Input Heat Capacity (BTU/hr)	33,475,000
Fuel	Natural Gas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	32,819
Annual Fuel Consumption (scf/yr)	287,491,176

Site Information

Jerome Barometric Pressure (mm Hg)	664.34

Stack Data

Stack Height (ft)	39.5
Stack Diameter (ft)	4.083
Exit Gas Temperature (°F)	350
Wet Actual Flow Rate (acfm)	10,389
Wet Standard Flow Rate (wscfm)	5,919
Dry Standard Flow Rate (dscfm)	4,859
Grain Loading Flow Rate (dscfm)	6,491
Stack Velocity (m/s)	4.03
Fd (dscf stack gas/BTU)	0.00871
Fw (wscf stack gas/BTU)	0.01061

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	NG Combustion	7.6	lb/10^6 scf	0.249	1.1	0.031
SO_2	NG Combustion	0.6	lb/10^6 scf	0.020	0.1	0.002
NO_x	NG Combustion	100	lb/10^6 scf	3.282	14.4	0.414
CO	NG Combustion	84	lb/10^6 scf	2.757	12.1	0.347
VOC	NG Combustion	5.5	lb/10^6 scf	0.181	0.8	0.023
Lead	NG Combustion	0.0005	lb/10^6 scf	1.64E-05	0.0	2.07E-06

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	NG Combustion	See PM_{10}	See PM_{10}	0.249	1.092	3.14E-02
Beryllium	NG Combustion	<1.2E-5	lb/10^6 scf	3.94E-07	0.000	4.96E-08
Mercury	NG Combustion	2.60E-04	lb/10^6 scf	8.53E-06	0.000	1.08E-06

PM Grain Loading Standard[b]

Pollutant	Pollutant Source	Potential Emissions (lb/hr)	Grain Load @ 3% Oxygen (gr/dscf)	PM Grain Standard[b] (gr/dscf)	Meets Standard?
PM	NG Combustion	0.249	0.004	0.015	yes

Notes:
(a) Emission factors from AP-42 Chapter 1.4, "Natural Gas Combustion", unless otherwise noted.
(b) IDAPA 58.01.01.677
(c) Boiler #1 and #2 are fully redundant. Only one boiler will operate at any one time. Maximum natural gas combustion in boilers will be 287,491,176 scf/year.

Toxic Air Pollutant Emissions
Boiler #2 (P107)

Combustion Source Characteristics	
Boiler Manufacturer	Superior Boiler Works (or equivalent)
Burner Model	Super Seminole 4000 (or Equivalent)
Input Heat Capacity (BTU/hr)	33,475,000
Fuel	Natural Gas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	32,819
Annual Fuel Consumption (scf/yr)	287,491,176

Site Information	
Jerome Barometric Pressure (mm Hg)	664.34

Stack Data	
Stack Height (ft)	39.5
Stack Diameter (ft)	4.08
Exit Gas Temperature (°F)	350
Wet Actual Flow Rate (acfm)	10,389
Wet Standard Flow Rate (wscfm)	5,919
Dry Standard Flow Rate (dscfm)	4,859
Grain Loading Flow Rate (dscfm)	6,491
Stack Velocity (m/s)	4.03
Fd (dscf stack gas/BTU)	0.00871
Fw (wscf stack gas/BTU)	0.01061

Toxic Air Pollutants

Pollutant	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (g/s)	Emission Limit[b] (lb/hr)
Arsenic	2.00E-04	lb/10^6 scf	6.56E-06	8.27E-07	1.50E-06
Barium	4.40E-03	lb/10^6 scf	1.44E-04	1.82E-05	3.30E-02
Benzene	2.10E-03	lb/10^6 scf	6.89E-05	8.68E-06	8.00E-04
Beryllium	<1.2E-5	lb/10^6 scf	3.94E-07	4.96E-08	2.80E-05
Benzo(a)pyrene	<1.2E-6	lb/10^6 scf	3.94E-08	4.96E-09	2.00E-06
Bis (2-ethylhexyl)phthalate	FNA	lb/10^6 scf	FNA	FNA	2.80E-02
Cadmium	1.10E-03	lb/10^6 scf	3.61E-05	4.55E-06	3.70E-06
Chromium	1.40E-03	lb/10^6 scf	4.59E-05	5.79E-06	3.30E-02
Cobalt	8.40E-05	lb/10^6 scf	2.76E-06	3.47E-07	3.30E-03
Copper	8.50E-04	lb/10^6 scf	2.79E-05	3.51E-06	3.33E-01
Dibutylphthalate	FNA	lb/10^6 scf	FNA	FNA	6.70E-02
Dichlorobenzene	1.20E-03	lb/10^6 scf	3.94E-05	4.96E-06	2.00E+01
Ethylbenzene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Fluorene	2.80E-06	lb/10^6 scf	9.19E-08	1.16E-08	1.33E-01
Formaldehyde	7.50E-02	lb/10^6 scf	2.46E-03	3.10E-04	5.10E-04
Hexane	1.80E+00	lb/10^6 scf	5.91E-02	7.44E-03	1.20E+01
Manganese	3.80E-04	lb/10^6 scf	1.25E-05	1.57E-06	3.33E-01
Mercury	2.60E-04	lb/10^6 scf	8.53E-06	1.08E-06	3.00E-03
Molybdenum	1.10E-03	lb/10^6 scf	3.61E-05	4.55E-06	3.33E-01
Napthalene	6.10E-04	lb/10^6 scf	2.00E-05	2.52E-06	3.33E+00
Nickel	2.10E-03	lb/10^6 scf	6.89E-05	8.68E-06	2.70E-05
Pentane	2.60E+00	lb/10^6 scf	8.53E-02	1.08E-02	1.18E+02
Phenol	FNA	lb/10^6 scf	FNA	FNA	1.27E+00
Selenium	<2.4E-5	lb/10^6 scf	7.88E-07	9.92E-08	1.30E-02
Toluene	3.40E-03	lb/10^6 scf	1.12E-04	1.41E-05	2.50E+01
Vanadium	2.30E-03	lb/10^6 scf	7.55E-05	9.51E-06	3.00E-03
o-Xylene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Zinc	2.90E-02	lb/10^6 scf	9.52E-04	1.20E-04	6.67E-01

Notes:
(a) Emission Factors from AP-42 Chapter 1.4, "Natural Gas Combustion".
(b) IDAPA 58.01.01.585 and 586
* FNA - Factor Not Available

Example Calculations – Boiler Emission Estimates

1. Wet Standard Stack Flow Rate = (Q_{ws}) = (F_w) (Input Heat Capacity of Boiler)

$$F_{w(Natural\ Gas)} = 0.01061\, wscf\ stack\ gas / BTU \quad (40\,CFR\,60, App\ A, Meth.19, Table\,19-1)$$

For Boiler:

$$Q_{ws} = (0.01061\, wscf\ stack\ gas / BTU)\left(33{,}475{,}000\frac{BTU}{hr}\right)\left(\frac{1hr}{60\,\text{min}}\right) = 5{,}919\,\text{wscf/min}$$

2. Dry Standard Stack Flow Rate = (Q_{ds}) = (F_d) (Input Heat Capacity of Boiler)

$$F_d = (0.00871\, dscf / BTU) \quad (40\,CFR, App\ A, Meth19, Table\,19-1)$$

For Boiler:

$$Q_{ds} = (0.00871\ dscf / BTU)\left(33{,}475{,}000\frac{BTU}{hr}\right)\left(\frac{1hr}{60\,\text{min}}\right) = 4{,}859\ \text{dscf/min}$$

3. Dry Standard Stack Flow Rate Corrected for 3% O_2 and Altitude = $(Q_{ds,O_2,AL}) = (Q_{ds})\left(\frac{20.9}{20.9-3}\right)\left(\frac{P_S}{P_A}\right)$

P_S = Standard Barometric Pressure = 760 mm Hg
P_A = Actual Barometric Pressure = 664.34 mm Hg (approximate barometric pressure for site)

For Boiler:

$$Q_{ds,O_2,AL} = (4{,}859\, dscf / \text{min})\left(\frac{20.9}{20.9-3}\right)\left(\frac{760\, mm\, Hg}{664.34\, mm\, Hg}\right) = 6{,}491\ \text{dscf/min}$$

4. Wet Actual Stack Flow Rate = $(Q_{wa}) = \left(Q_{ws}\right)\left(\frac{P_S}{P_A}\right)\left(\frac{T_A}{T_S}\right)$

T_S=Standard Temperature= 273.15 K
T_A=Actual Temperature= 449.82 K (Boiler stack gas)

For Boiler:

$$Q_{wa} = (5{,}919 wscf/\min)\left(\frac{760\,mm\,Hg}{664.34\,mm\,Hg}\right)\left(\frac{449.82K}{293.15K}\right) = 10{,}389\,\text{wscf/min}$$

5. Volume Fuel Combusted = (V_c) = (Product Consumption Rate)(Hours of Operation)

For Boiler:

$$V_C = \left(32{,}819\,\frac{scf}{hr}\right)(8{,}760\ hour) = 287.5\ x10^6\ scf$$

6. Potential Emissions

Potential Emission Rate of Contaminant = (M_x) = (EF)(fuel consumption rate)
EF = Emission Factor, provided by equipment vendor or from AP-42.

For Boiler:

$$M_{PM_{10}} = \left(7.6\,\frac{lb}{10^6\,scf}\right)\left(32{,}475{,}000\,\frac{BTU}{hr}\right)\left(\frac{1scf}{1{,}020BTU}\right) = 0.249\,\frac{lb}{hr} = 0.0314\,\frac{g}{s}$$

$$= \frac{\left(0.249\,\frac{lb}{hr}\right)\left(24\,\frac{hr}{day}\right)\left(365\,\frac{day}{yr}\right)}{2000\,\frac{lb}{ton}} = 1.1\,\frac{ton}{yr}$$

7. Particulate Matter Grain Emission Rate =

$$\left(PM_g\right) = \left(M_{pm}\left[\frac{g}{s}\right]\right)\left(\frac{15.43grain}{1g}\right)\left(\frac{60S}{1\min}\right)$$

For Boiler:

$$PM_g\left(0.0314\,\frac{g}{s}\right)\left(\frac{15.43grain}{1g}\right)\left(\frac{60s}{1\min}\right) = 29.07\,\frac{grain}{\min}$$

8. Grain Loading Concentration Corrected to 3% O_2 and Altitude (C_{pm}) = $\frac{PM_g}{Q_{ds,O_2,AL}}$

For Boiler:

$$C_{PM} = \frac{29.07 \frac{grain}{\text{min}}}{6{,}491 \frac{dscf}{\text{min}}} = 4 \, x \, 10^{-3} \, \frac{grain}{dscf}$$

Air Pollutant Emissions
Emergency Generator (P108)

Combustion Source Characteristics		Stack Data	
Generator Manufacturer	Cummins	Stack Height (ft)	13.8
Model		Stack Diameter (ft)	2.67
Input Heat Capacity (MMBTU/hr)	9.24	Exit Gas Temperature (°F)[c]	500
Break Horsepower (bhp)	1,490	Wet Actual Flow Rate (acfm)	3,399
Power Generation (ekW)	1,000	Wet Standard Flow Rate (wscfm)	1,590
Fuel	Diesel	Dry Standard Flow Rate (dscfm)	1,416
Heating Value (BTU/gal)	128,000	Grain Loading Flow Rate (dscfm)	1,891
Max Hourly Biogas Fuel Consumption (gal/hr)	72	Stack Velocity (m/s)	3.08
Unlimited Annual Fuel Consumption (gal/yr)	632,472	Fd (dscf stack gas/BTU)	0.00919
		Fw (wscf stack gas/BTU)	0.01032

Miscellaneous Support Data	
Pressure at Standard Conditions (atm)	1
Temperature at Standard Conditions (K)	293
Ideal Gas Constant (atm-ft^3/mol-K)	1.314
Jerome Barometric Pressure (atm)	0.87

Criteria Pollutants

Pollutant	Emission Factor[a]	Emission Factor Unit	Potential Emissions (lb/hr)	Limited Potential Emissions (TPY)[b]
PM_{10} (assume = PM)	0.19	g/bhp-hr	6.24E-01	0.16
SO_2	0.11	g/bhp-hr	3.61E-01	0.09
NO_x [d]	5.2	g/bhp-hr	17.08	4.27
CO	0.66	g/bhp-hr	2.17	0.54

Notes:

(a) Emission factors for PM, SOx, CO, and NOx supplied by the equipment manufacturer (Cummins). Assumed worst-case exhaust emission data from equipment manufacturer.

(b) Limited to 500 hours of operation per year.

(c) The discharge temperature for the generator exhaust was reduced from 873 °F to 500 °F to account for heat losses from exhaust manifold to discharge elevation.

(d) NOx emissions for the emergency generator include oxides of nitrogen and total unburned hydrocarbons.

Air Pollutant Emissions
Emergency Generator (P108)

Combustion Source Characteristics

Genset Manufacturer	
Genset Model	
Engine Manufacturer	Cummins
Engine Model	QSX15-G9 Nonroad 2 (or equivalent)
Break Horsepower (bhp)	1,490
Power Generation (kW - prime)	1,000
Fuel	Diesel
Max Hourly Fuel Consumption (gal/hr)	72.2
Controlled Fuel Consumption (gal/yr)	36,100.0
Heating Value (BTU/gal)	128,000
Heat Input Capacity (BTU/hr)	9,241,600

Toxic Air Pollutants

Pollutant	Emission Factor[a] (lb/MMBtu)	Uncontrolled Emissions (lb/hr)	Controlled Emissions (ton/yr)[b]	Emissions Limit (lb/hr)
Benzene	7.76E-04	7.17E-03	1.79E-03	8.0E-04
Toluene	2.81E-04	2.60E-03	6.49E-04	2.5E+01
Xylenes	1.93E-04	1.78E-03	4.46E-04	2.9E+01
Formadehyde	7.89E-05	7.29E-04	1.82E-04	5.1E-04
Acetaldehyde	2.52E-05	2.33E-04	5.82E-05	3.0E-03
Acrolein	7.88E-06	7.28E-05	1.82E-05	1.7E-02
Naphthalene	1.30E-04	1.20E-03	3.00E-04	3.3E+00
Fluorene	1.28E-05	1.18E-04	2.96E-05	1.3E-01
Benzo(a)pyrene	2.57E-07	2.38E-06	5.94E-07	2.0E-06
Total PAH	2.12E-04	1.96E-03	4.90E-04	9.1E-05

Notes:
(a) Emission factors from AP-42 Chapter 3.4, "Large Stationary Diesel and All Stationary Duel-fuel Engines
(b) Emission rates were reduced due to limited hours of operation of 500 hrs.

Power Generation

EPA Tier 2 Exhaust Emission Compliance Statement 1000DQFAD

60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with U.S. EPA and California emission regulations under the provisions of 40 CFR 89, Nonroad (Mobile Off Highway) Tier 2 emissions limits when tested per ISO 8178 D2.

Engine Manufacturer:	Cummins Inc
EPA Certificate Number:	CEX-NRCI-07-07
Effective Date:	09/15/2006
Date Issued:	09/18/2006
EPA Nonroad Diesel Engine Family:	7CEXL030.AAD
CARB Executive Order:	U-R-002-0368

Engine Information:

Model: Cummins Inc QST30-G5 NR2
Engine Nameplate HP: 1490
Type: 4 Cycle, 50°V, 12 Cylinder Diesel
Aspiration: Turbocharged and Low Temperature Aftercooled (Air-to-Air)
Compression Ratio: 14.7:1
Emission Control Device: Tirbocharged and Low Temperature Aftercooled(Air-to-Air)

Bore: 5.51 in. (140 mm)
Stroke: 6.5 in. (165 mm)
Displacement: 1860 cu. in. (30.5 liters)

U.S. Environmental Protection Agency Nonroad Tier 2 Limits

COMPONENT	(All values are Grams per HP-Hour)
NOx + HC (Oxides of Nitrogen as NO2 + Total Unburned Hydrocarbons)	4.77
CO (Carbon Monoxide)	2.61
PM (Particulate Matter)	0.15

Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Power Generation

Exhaust Emission Data Sheet
1000DQFAD
60 Hz Diesel Generator Set

Engine Information:

Model:	Cummins Inc. QST30-G5 NR2	Bore:	5.51 in. (139 mm)
Type:	4 Cycle, 50°V, 12 Cylinder Diesel	Stroke:	6.5 in. (165 mm)
Aspiration:	Turbocharged and Low Temperature aftercooled	Displacement:	1860 cu. in. (30.4 liters)
Compression Ratio:	14.7:1		
Emission Control Device:	Aftercooled (Air-to-Air)		

PERFORMANCE DATA	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full Prime	
BHP @ 1800 RPM (60 Hz)	371	741	1112	1482	1322	
Fuel Consumption (gal/Hr)	19.1	35.8	54.1	72.2	63.9	
Exhaust Gas Flow (CFM)	2780	4500	6370	7540	6950	
Exhaust Gas Temperature (°F)	620	760	814	890	873	
EXHAUST EMISSION DATA						
HC (Total Unburned Hydrocarbons)	0.12	0.10	0.08	0.07	0.08	
NOx (Oxides of Nitrogen as NO2)	4.17	5.20	3.87	3.95	4.00	
CO (carbon Monoxide)	0.66	0.36	0.48	0.66	0.58	
PM (Particular Matter)	0.19	0.15	0.12	0.11	0.11	
SO2 (Sulfur Dioxide)	0.11	0.10	0.10	0.11	0.10	
Smoke (Bosch)	0.88	0.80	0.79	0.73	0.75	

All Values are Grams/HP-Hour, Smoke is Bosch #

TEST CONDITIONS

Data was recorded during steady-state rated engine speed (± 25 RPM) with full load (±2%). Pressures, temperatures, and emission rates were stabilized.

Fuel Specification:	46.5 Cetane Number, 0.035 Wt.% Sulfur; Reference ISO8178-5, 40CFR86.1313-98 Type 2-D and ASTM D975 No. 2-D.
Fuel Temperature:	99 ± 9 °F (at fuel pump inlet)
Intake Air Temperature:	77 ± 9 °F
Barometric Pressure:	29.6 ± 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H2O/lb dry air
Reference Standard:	ISO 8178

The NOx, HC, CO and PM emission data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

Appendix 2

Copy of Public Meeting Notice

IMP

IDAHO MILK PRODUCTS INC.

165 SOUTH 100 EAST

JEROME, IDAHO 83338

805-341-1214

FAX: 866-465-2191

tysenter@aol.com

NOTICE OF HEARING

The public is invited to attend an informational meeting concerning Idaho Milk Products Inc. proposed milk processing plant to be located at 165 South 100East Jerome, Idaho.

The meeting will be held on October 25, 2007 at 1:00 pm at the Jerome Library conference room A.

Dated this 13th day of October

Tom Myers

President,

Idaho Milk Products

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ing teacher pay system is the foundation of I-STARS. Every Idaho teacher will still be paid based on their experience and the number of years they teach. The minimum teacher salary is currently $31,000.

2. Student Achievement: Up to $3,600 per person. All certificated staff in a school can earn pay increases — between $1,200 and $3,600 in a year — if the entire school demonstrates growth and/or overall proficiency in student performance.

3. Local Control: $2,400 per person annually. School districts and charter schools will have the funds and the flexibility to attract per person annually. Teachers will have the opportunity to forgo tenure and earn an annual pay increase by working under the same contract as school administrators.

5. Expertise: Up to $2,400 per person annually. Teachers will be rewarded for gaining more expertise and earning qualifications to teach in multiple subject areas.

6. Leadership: $2,400 per person. Teachers will be given the opportunity to advance in their careers and earn pay increases while staying in the classroom and taking on leadership duties within their schools or districts.

There were over 6,200 reported incidents of intimate partner violence in 2006.

• Family violence increased from 2005 to 2006, and, in addition to the intimate partner violence mentioned above, there were 2,018 incidents of family violence.

Women, in particular Indian women, suffer disproportionately high rates of domestic violence. According to the U.S. and dating violence intervention, prevention and education advocacy organizations. People in your community need help and there are those who can provide it. For more information about domestic and dating violence prevention, education and awareness initiatives and funding legislation I've been working on, please visit my website: http://crapo.senate.gov.

Notice of meeting

The public is invited to attend an informational meeting concerning Idaho Milk Products Inc. proposed milk processing plant to be located at 165 South 100 East Jerome, Idaho.

The meeting will be held on Oct. 25 at 1 p.m. at the Jerome Library conference room A.

Dated this 13th day of October

Tom Myers
President,
Idaho Milk Products

'e this hunting season

ıd's rest ınd ne. sue ers ect or ıg ıve ıil- he ect ng l a ng est rd ef he n-

Pheasants Forever members have long led by example, but with the annual arrival of season openers, it bears repeating: Be a hunter that's knowledgeable in the laws, ethics, and conservation values of our sport.

And remember, a safe hunt is always a successful hunt, empty game bag or not."

Helpful Hunter Safety Tips

• Treat every gun as if it were loaded.

• Always keep your muzzle pointed in a safe direction.

• Know your target and what is beyond.

• Wear hunter orange.

• Always use non-toxic shot for migratory birds.

• Always ask permission before going onto private land.

• Become familiar with your state's signage system. Know what signs indicate a state wildlife management area or federal waterfowl production area open to public hunting.

• PF's orange "Habitat" signs DO NOT indicate public property.

TOR POLICY

newspaper are the opinion this newspaper. Our policy ıe deadline for submitting ed and include the author's t your submissions to 400 *th Side News* reserves the y. We welcome letters and u to our office; mailed 324-4904; or e-mailed to

The North Side News

Located at 133 East Main St., Jerome, Idaho

Official newspaper for Jerome, Eden, Hazelton, and Jerome County, Idaho

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Circulation: Nicole Winson
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Appendix 3

Modeling Protocol and IDEQ Response

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 NORTH HILTON, BOISE, ID 83706 · (208) 373-0502

C. L. "BUTCH" OTTER, GOVERNOR
TONI HARDESTY, DIRECTOR

October 18, 2007

Troy Rieke, P.E.
Project Engineer
Millenium Science & Engineering, Inc.

RE: Modeling Protocol for the Idaho Dairy Products Facility Located in Jerome, Idaho

Dear Troy:

DEQ received your dispersion modeling protocol on October 5, 2007. The modeling protocol was submitted on behalf of Idaho Dairy Products. The modeling protocol proposes methods and data for use in the ambient impact analyses of a 15-Day Pre-Permit to Construct application for a new milk processing plant in Mountain Home, Idaho.

The modeling protocol has been reviewed and DEQ has the following comments:

- Comment 1: Based on the modeling protocol DEQ assumes all proposed emissions sources will be considered for the preliminary analyses, and, if applicable, the full impact analyses for the compliance demonstration with the National Ambient Air Quality Standards (NAAQS).

- Comment 2: The application should provide documentation and justification for stack parameters used in the modeling analyses, clearly showing how stack gas temperatures and flow rates were estimated. Include calculations and assumptions. In most instances, applicants should use typical parameters, not maximum temperatures and flow rates. Document whether a release is vertical and uninterrupted, horizontal, or capped on an individual emission point basis.

  The exhaust parameters and modeling approaches for sources that are to be determined will be reviewed during the initial 15-day period following submittal of the permit application prior to issuance of pre-permit construction authorization or denial. Include all information requested in Section 5.4.2 of the *State of Idaho Air Quality Modeling Guideline* for each emissions source.

- Comment 3: The proposed receptor grid appears reasonable. However, it is the applicant's responsibility to use a sufficiently tight receptor network such that the maximum modeled concentration is reasonably resolved. If DEQ conducts verification modeling analyses with a tighter receptor grid and compliance with standards is no longer demonstrated, the permit will be denied.

- Comment 4: When modeling carcinogenic TAPs, the applicant may use a 5-year meteorological data set, using the period average concentration, rather than five separate 1-year data sets.

- Comment 5: DEQ determined the following default background concentrations for small town/suburban areas are most appropriate for the site location in Jerome: PM_{10} 24-hr = 81 $\mu g/m^3$; PM_{10} annual = 27 $\mu g/m^3$; CO 1-hr = 3,600 $\mu g/m^3$; CO 8-hr = 2,300 $\mu g/m^3$; NO_2 annual = 17 $\mu g/m^3$; SO_2 3-hr = 34 $\mu g/m^3$; SO_2 24-hr = 26 $\mu g/m^3$; SO_2 annual = 8 $\mu g/m^3$; and, Pb quarterly = 0.03 $\mu g/m^3$.

- Comment 6: Provide a complete, scaled facility plot plan that includes the locations of all proposed emissions sources and buildings with the permit application. All building dimensions must be included either in the plot plan or in a table.

- Comment 7: Please include all modeling files, including the BPIP input file and any initial modeling runs using a coarse grid.

- Comment 8: Provide a detailed description of the determination of the ambient air boundary. The facility must prevent public access inside the ambient air boundary using methods described in Section 5.5 of the *State of Idaho Air Modeling Guideline*. The receptor network must be adjusted accordingly.

- Comment 9: AERMOD Version 07026 must be used for your dispersion analyses.

DEQ's modeling staff considers the submitted dispersion modeling protocol, with resolution of the additional items noted above, to be approved. It should be noted, however, that the approval of this modeling protocol is not meant to imply approval of a completed dispersion modeling analysis. Please refer to the *State of Idaho Air Quality Modeling Guideline*, which is available on the Internet at http://www.deq.state.id.us/air/permits_forms/permitting/modeling_guideline.pdf, for further guidance.

To ensure a complete and timely review of the final analysis, our modeling staff requests that electronic copies of all modeling input and output files (including BPIP, raw meteorological data files, AERMET input and output files, and AERMAP input and output files) are submitted with an analysis report if a different dataset than provided to you by DEQ is used for this project.. If you have any further questions or comments, please contact me at (208) 373-0536.

Sincerely,

Darrin Mehr
Air Quality Analyst
Idaho Department of Environmental Quality

MSE **Millennium Science & Engineering, Inc.**

1605 N. 13th Street
Boise, Idaho 83702
Phone: (208) 345-8292
Fax: (208) 344-8007

October 5, 2007

Mr. Kevin Schilling
Air Quality and Permits Manager
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706

Re: Protocol for Air Dispersion Modeling to Support Pre-Permit Construction Approval and PTC Application, Milk Processing Plant, South 100 East, Jerome, Idaho

Dear Kevin:

Please find attached our proposed Air Modeling Protocol for air dispersion modeling that will be completed to support a Pre-Permit Construction Approval and PTC application for a proposed milk processing plant in Jerome, Idaho. The plant will be located north of the intersection of South 100 East and East 200 South. The format of this document follows the format suggested in the December 31, 2002 "State of Idaho Air Quality Modeling Guideline."

We request that you review and approve this protocol. We will then proceed with modeling following the approved protocol. Please contact me at (208) 345-8292 if you have any questions regarding this modeling protocol.

Sincerely,

Troy Riecke

Troy Riecke, P.E.
Project Engineer

C5331.doc

cc: William Rogers – Idaho DEQ
Aaron Baker – Big-D Construction

Modeling Protocol – Milk Processing Facility
Jerome, Idaho Facility

1.0 Purpose

Air dispersion modeling is proposed to demonstrate compliance with National Ambient Air Quality Standards (NAAQS) for criteria pollutants and Idaho Department of Environmental Quality (IDEQ) standards for TAPs in support of a Pre-Permit Construction Approval and PTC application for a proposed milk processing plant to be constructed and operated in Jerome, Idaho.

2.0 Model Description / Justification

Air dispersion modeling will be performed using the Environmental Protection Agency (EPA) AERMOD model.

3.0 Emission and Source Data

A milk processing plant is proposed to be constructed at the site. Milk will be processed in two natural gas fired dryers to prepare dry products. Air blown through a skim milk dryer will flow through cyclones and then through baghouses to recover milk powder and reduce particulate emissions. Air blown through a permeate dryer will flow through cyclones and then through a scrubber. Dried milk products from the dryers will pass through a fluid bed, then through a sifter to packaging. There will be two boilers at the facility that will combust natural gas to produce steam for the milk drying process. There will also be an emergency generator that will combust diesel fuel. Table 1 provides a list of the emission sources and the pollutants that will be modeled at the site.

Table 1
Emission Sources and Pollutants to be Modeled

Emission Source	Criteria Pollutants				Toxic Air Pollutants (TAPs)				
	PM_{10}	NO_x	CO	SO_x	As	Benz-ene	Cd	CH_2O	Ni
Fuel Combustion Equipment									
Boiler #1	X	X	X	X	Y	Y	Y	Y	Y
Boiler #2	X	X	X	X	Y	Y	Y	Y	Y
Permeate Dryer Burner	X	X	X	X	Y	Y	Y	Y	Y
Skim Dryer Burner	X	X	X	X	Y	Y	Y	Y	Y
Emergency Generator	X	X	X	X	Y	Y	Y	Y	Y
Particulate Matter Emission Sources									
Skim Dryer Baghouse 1	X								
Skim Dryer Baghouse 2	X								
Skim Fluid Bed Baghouse	X								
Permeate Dryer Scrubber	X								
Permeate Fluid Bed Baghouse	X								
Permeate Powder Receiver Baghouse	X								

Note: an "X" represents that the pollutant will be modeled for that source and a "Y" represents toxic air pollutants that will be modeled if estimated emission rates exceed the applicable emission limit (EL).

4.0 Receptor Network

A receptor network will be established so that ambient concentrations can be evaluated. The first step in this process is to determine the location of the ambient air boundary and the second step is to assign receptor locations within the ambient air zone.

4.1 Ambient Air Boundary

The ambient air boundary will be the facility's property boundary (fence line).

4.2 Receptors

Receptors will be established to determine maximum ambient air concentrations. A receptor grid with approximately 300 feet spacing will be established across the entire evaluated area. Receptors along the ambient air boundary will be spaced approximately 100 feet apart. No receptors will be established within the facility's controlled property boundary.

5.0 Elevation Data

Topography data for the site will be obtained from the USGS as a 7.5 minute digital elevation model (DEM). AERMAP will be used to preprocess the data for use in AERMOD.

6.0 Meteorological Data

Meteorological data (surface and upper air) from the Boise airport, provided by the IDEQ, will be used for modeling. Because this data may not be representative of actual meteorological conditions at the proposed plant location, a safety factor of twenty percent (20%) will be applied to model results prior to adding in background concentrations. If modeling cannot demonstrate compliance with NAAQS using the safety factor then additional analysis will be performed using other meteorological datasets from the region to determine the upper and lower bounds of the likely representative values. The IDEQ will be contacted prior to performing modeling with additional meteorological data.

7.0 Land Use Classification

The facility is industrial while the surrounding land is a mix of open space/agricultural and commercial land uses. Air dispersion modeling will be performed using a "rural" classification.

8.0 Background Concentrations

Background ambient air concentrations for criteria pollutants will provided by the IDEQ.

9.0 Evaluation of Compliance With Standards

For the criteria pollutants, the applicable background concentrations will be added to the predicted ambient concentrations determined from air dispersion modeling to result in total ambient concentrations. These total ambient concentrations will be compared to the NAAQS. If total ambient concentrations exceed the NAAQS, the emission source will be modified (*e.g.,* operational controls, emission controls, modification of stack

configuration) and the emission sources will be remodeled until no exceedance of the NAAQS occurs.

For the toxic air pollutants, predicted ambient air concentrations will be compared to applicable AAC and AACC listed in IDAPA 58.01.01.585 and 586, respectively. If an applicable AAC or AACC is exceeded by a predicted ambient air concentration, the risk associated with that exceedance will be considered and discussed with the Idaho DEQ.